

AGGREGATES

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Oregon's diversified geography is rather unique. Some of its characteristics include the Pacific Ocean coast line, a wealth of fertile valleys, the Cascade Mountains, and vast areas of High Desert Plains. Because of this, a variety of aggregate sources exist in Oregon including glacier deposits, volcanic deposits, and river deposits.

During the early years of road building, many of the quality river source aggregates were depleted. These river deposits consisted of rock that had rolled down the river. These sources produced quality aggregates because the durable rock made it down river and formed deposits while the poor rock fell apart and was washed away.

Now that the majority of these river deposits are gone, Oregon must use natural rock deposits that exhibit a wide variety of physical, chemical, and geological properties. To help ensure the quality of these aggregates, the Oregon State Highway Division (OSHD) has specifications regarding test requirements. These tests can generally be classified as tests to obtain information about a specific aggregate for a specific use and tests to provide information needed in the design and control of mixtures. The following are some tests used by the OSHD.

Slake Durability of Shales and Similar Weak Rocks (ASTM D-4644-87)

This is one of the most recent tests that the OSHD Materials & Research Section has adopted from the American Society For Testing And Materials (ASTM) standards. Oregon recently started using this test to estimate the durability of weak rocks. The test method covers the determination of the slake durability index of a shale or other similar rock after two drying and wetting cycles with abrasion. The results help predict how this type of rock will behave in the road base or other service environments.

Determination Of Elongated Material In Coarse Aggregates (OSHD 229)

This test is used to determine the percentage of elongated pieces of coarse aggregates used for portland cement or bituminous concrete mixtures. Excessive elongated aggregate pieces in the mixture are objectionable because they tend to be fragile and they will not readily rearrange themselves in the mix, thus creating excessive air voids which reduce the strength of the final product. In some cases, a number of these rocks, laying crosswise in the mix, form a shear plane of low strength and may contribute to failure. These pieces are considered deleterious substances and should be kept to a specified minimum.

Resistance To Abrasion Of Small Size Coarse Aggregate By Use Of The Los Angeles Abrasion Machine (ASTM C-131)

Aggregates must be able to resist abrasion (wearing away) and degradation (breaking apart) under traffic. This test measures an aggregate's resistance to wear or abrasion. A rotating steel drum containing steel balls applies a combination of actions to the aggregate, including abrasion, attrition, impact, and grinding. The resistance to abrasion is an indication of two desirable qualities: hardness and toughness. Though closely related, hardness relates more to abrasion resistance while toughness is a resistance to fracture under impact. Abrasion test requirements also give a general indication of pavement wear resistance.

Dust Or Clay Coating On Produced Coarse Aggregates For Use On Highway Construction (OSHD 226)

This test covers a procedure to determine the amount of dust coating remaining on the coarse aggregates after they have been subjected to wet screening. This is important because it will show if the aggregate is clean enough to allow for good adhesion between the asphalt and rock.

Grading (AASHTO T 27)

Grading is the size distribution of mineral dust, mineral filler, fine aggregate, and coarse aggregate. This gradation is usually characterized by a distribution of the percentages passing a series of sieve openings. Size distribution of the aggregate is important for several reasons. In concrete, the largest size particles must be small enough to be placed between the steel reinforcement bars, forms, etc. In asphalt concrete, the largest particle size must be small enough to be accommodated easily within the bituminous layers that make up a pavement.

Heavy Duty AC Pavement Aggregates

In 1989, the OSHD initiated an experimental specification controlling aggregate gravity and absorption on heavy duty interstate freeway projects in an attempt to achieve consistent AC mixtures. As early trials appeared successful, the experimental specification was used on additional projects. Today, it is specified on all heavy duty AC projects.

Currently, the development of a Rock Resource Management Program is being discussed for future implementation. The objective of the program is to identify and make available rock sources which can be used for heavy duty AC pavements.

High quality aggregates are important for successful paving projects. OSHD personnel will continue to search for innovative ways to improve the quality of aggregates used in highway construction.

For additional information regarding aggregates, please contact:

Anthony George
Roadway Materials Engineer
Materials and Research Section
800 Airport Road, S.E.
Salem, Oregon 97310
378-2621